ERM-Southwest, inc.

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September 29, 1989

Mr. Garret Bondy
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

W.O. #92-13

Subject: Phase II Work Plan, Arkwood, Inc. Site, Omaha, Arkansas

Dear Mr. Bondy:

In response to your letter of September 13, 1989 and at the request of Mass Merchandisers, Inc., ERM-Southwest, Inc. is pleased to provide you with this copy of the Final Phase II Work Plan. For your convenience, copies of individual pages which were revised based on the latest EPA comments have also been provided on which the new material is underlined and any deleted material crossed out. An item by item response to these comments is provided below.

The following comments are numbered to correspond to your September 13, 1989 letter:

1. Page 2-2, Para. 4: This proposed sampling only includes New Cricket Spring. Section 2.2.2 should be modified to include the Railroad Spring. In addition, please evaluate the benefit of monitoring on-site ground water monitoring wells during the sampling period. It would seem beneficial to understand or know if water levels in wells react to a significant rain event and the relationship of water level fluctuations in the monitoring well network.

   Response: Both of these suggestions have been incorporated into the work plan. It should be noted that no hydrograph is available for the railroad tunnel spring. It is unknown if the railroad tunnel spring reacts within a similar time frame to rainfall events as does New Cricket Spring. The installation of a temporary staff gauge in the railroad tunnel channel will give an indication of the spring's flow stage.

2. Page 2-3, Para. 1: Include a provision for Mr. Barker to notify EPA prior to the sampling event if possible. Also, Mr. Barker should be replaced by an ERM representative if logistically possible.

   Response: These provisions were added to the work plan.

3. Page 2-6, Para. 2: How will the "quality" of the water be determined?

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Response: The text of the work plan was modified to indicate that the presence or absence of target parameters would be determined by laboratory analysis. A rapid (48-hour) turnaround would be requested for analytical results.

4. Page 2-6, Para. 3: What instances would cause PVC casing to be substituted for steel?

Response: Text was added to clarify under what circumstance PVC would be substituted for steel.

5. Page 2-6, Para. 3: Define in more detail what criteria will be used to determine if a well nest is appropriate.

Response: The appropriateness of a well nest will be determined in the field at a time when all the pertinent geological information can be evaluated. However, additional text was added to the work plan to provide further details of some of the criteria to be used in making this decision.

6. Page 2-9, Para. 1: It is unclear if all of the logs will be used on all of the wells. Clarify this and explain the limitations of the logs for given borehole conditions.

Response: More information was added to the work plan explaining the limitations of the selected geophysical logs. As discussed, it is our intent to use the entire suite of logs on the deep on-site well, W-13, and monitor well PW-1.

7. Page 2-10, Para 1: Provide a schedule with dates when available.

Response: The milestone chart shown on Figure 2-2 indicates the schedule and sequence of events. Phase II work will begin on October 2, 1989.

As discussed in the September 11, 1989 meeting, the dye tracer study cannot be completed in time to be included in the final RI report. If appropriate weather conditions do not occur, it may also not be possible to complete the final well and spring sampling event and serial sampling event prior to submittal of the final RI report. In this case, data from these two sampling events will not be available for inclusion in the inorganic water chemistry study.

Therefore, it is proposed that the results of the dye tracer study be submitted in a separate document to be appended to the final RI report. Once a projected completion date is available for the tracer study, a deadline will be established for completing the remaining two water sampling tasks, assuming they have not already taken place. If the serial sampling event has not been completed by the deadline, it will be eliminated. If the final well and spring sampling event has not been completed by the deadline, it will be promptly conducted regardless of the flow stage and the analytical data will be appended to the tracer study report. Any inorganic water chemistry data obtained after submittal of the final RI report will be added to the data base and evaluated. Results of this evaluation would be handled as an addendum.

If you have any questions regarding the Final Phase II Work Plan, please call me or Mr. Steve Calhoun.

Sincerely,

ERM-SOUTHWEST, INC.

Richard H. Fuller, P.G.
Principal

RHF/mfa:0063
Attachments

cc: Bob Barker, Mass Merchandisers, Inc.
Bob Ritchie, McKesson Corporation
Jean Mescher, McKesson Corporation
Dinah Darman, McKesson Corporation
Allan Gates, Mitchell, Williams, Selig & Tucker
Brent Truskowski, U.S. Environmental Protection Agency
Doice Hughes, Arkansas Department of Pollution Control and Ecology
Dan MacLemore, Weston
Douglas Diehl, ERM-Southwest, Inc.
Steve Calhoun, ERM-Southwest, Inc.

REVISED PAGES

is used to mean that a sample representing the entire thickness of the ash or soil interval is obtained. Each of the samples will be analyzed for indicator compounds. In addition, two ash and two soil samples will be analyzed for chlorinated dibenzodioxins and dibenzofurans.

2.2 Ground and Surface Water Investigation

2.2.1 Well and Spring Sampling

One additional moderate to high flow, well and spring sampling event remains to be completed from the phase I investigation. It is proposed that this task be carried forward into phase II and completed during the first available appropriate flow stage. The same procedures and protocol will be followed as in the previous sampling events. The only change will be the addition of an extra surface flow sampling point at the northwest end of Cricket Railroad Tunnel. However, it should be pointed out that on only one occasion during the entire phase I investigation was water noted to be flowing into the northwest end of the tunnel in sufficient quantities to permit the collection of a sample.

2.2.2 Serial Sampling of New Cricket Spring

The Parshall flume and attached Stevens recorder that were installed in New Cricket Spring have provided documentation of the rapid response of this spring to major rainfall events. By periodically collecting samples during a rainfall event, it may be possible to determine the reaction of constituent organic concentrations to increasing flow rates. The possibility of aquifer "flushing" could be evaluated and additional understanding of the flow regime might be gained. The variation in inorganic water quality parameters would also be examined.

It is proposed that a serial sampling event, such as that just described, be conducted at New Cricket Spring and the railroad tunnel spring. Sampling for indicator compounds and water quality parameters would be initiated, if possible, immediately before the rainfall event begins and continue at two to four-hour intervals until after flow rates have begun to recede. A staff gage will be used to measure the relative flow rate of the railroad tunnel spring channel, thus allowing correlation with the flow rate of New Cricket Spring. New Cricket Spring hydrographs indicate that the flow rate can begin increasing in less than one hour after rainfall begins and peak within eight hours or less. It will therefore be necessary to have samplers on site prior to the time rainfall begins so that the initial, base flow sample can be obtained.

The uncertainties of weather makes logistics difficult. If a satisfactory rainfall event does not coincide with the appropriate personnel from ERM-Southwest and EPA being on site for other purposes, it may be necessary for ERM-Southwest and EPA personnel to mobilize well in advance of an anticipated storm system, and hope for the desired outcome. Obviously, this could result in considerable unnecessary expense if the rain storm failed to materialize. As an option, we propose that a local individual who would have the ability to mobilize at a moment's notice if appropriate weather conditions occurred be trained to initiate the sampling event. Mr. Bob Barker lives approximately 20 minutes from the site and has expressed his willingness to conduct this sampling project in the absence of an ERM-Southwest representative. He is familiar with the site and general sampling procedures and could be quickly instructed as to the objectives and any special procedures to be utilized for this project; i.e., sample preservation and chain-of-custody procedures. Should the situation arise where Mr. Barker has to initiate this sampling event, he will try to immediately contact ERM-Southwest, Inc., EPA and Weston project personnel. If possible, Mr. Barker will be replaced by an ERM-Southwest, Inc. representative who will complete the sampling event.

If time permits, it is proposed that water levels in the on-site monitor wells be periodically measured during the rainfall and sampling event. As a minimum effort, water levels will be measured before the rainfall begins, at high flow as indicated by the Stevens recorder in New Cricket Spring Channel and once or twice as the flow rate subsides.

2.2.3 Ground Water Chemistry Characterization

It is proposed that inorganic water quality parameters for the well and spring samples be more closely examined. By establishing background values and "fingerprinting" each of the samples, various trends, natural groupings, or anomalies might be noted which could have significance to the characterization of the karst aquifer and the existing flow regime. Based on analysis of certain parameters, it may also be possible to say something about ground water residence times and general source areas.

To facilitate this investigation, the appropriateness of various computer-generated plots will be evaluated for use with the Arkwood data. Trilinear plots (Piper diagrams) and Stiff diagrams are two of the alternatives currently being evaluated. It is expected that this evaluation and characterization of ground water chemistry will be initiated either before other phase II activities begin or very early in the phase II schedule. Therefore, if unexplained data anomalies are found to exist, sufficient time will be available to resolve the potential problem.

of the least reliable investigative techniques to be used in karst terrain. However, there are some specific questions about the Arkwood, Inc. site hydrogeology that can only be addressed by the installation of more wells. To date, only one monitor well, PW-1, has penetrated the Sylamore Sandstone into the underlying Ordovician dolomites. Based on this one well, with the support of outcrop observations, some significant conclusions were reached concerning the possible function of the Sylamore Sandstone as an aquitard and the apparent lack of ground water movement through the Powell Dolomite. It is proposed that one additional deep monitor well be installed using the same method of construction as PW-1 so that only the Powell Dolomite will be monitored. Immediately adjacent to this new well, a second shallower well will be installed that monitors only the St. Joe Formation and possibly some of the deeper residuum, depending upon the depth to bedrock.

During installation of the deep well, the residuum will be sampled at five foot intervals to the top of bedrock. A decision will be made as to the necessity of casing the residuum based on its moisture content and its ability to produce water. Similarly, the need to case a portion of the St. Joe Formation will be evaluated based upon the quantity and quality of water encountered. Water quality will be determined by a rush analysis of a water sample. If necessary, a casing will be set and grouted in place prior to proceeding with the drilling. Whether or not the residuum and St. Joe Formation are cased, a casing will be set one to two feet into the Powell Dolomite and grouted in place. Below this, the well will be uncased if it is felt the hole can be maintained in an open condition as is PW-1. All strata below the residuum will be continuously cored with an NX core barrel. Cores of the St. Joe Formation will be closely examined for evidence related to the depth of karstification. This data will then be compared to similar data for PW-1, MW-2 and MW-3. Samples of the Sylamore Sandstone will be sent to the laboratory for permeability testing. Coring will continue to near the base of the Powell Dolomite. Construction details of the shallow, adjacent well will be decided after deep well installation. In general, shallow well construction will probably be similar to that of MW-1 or MW-3 with the use of PVC screen and casing being suggested.

Three additional residuum wells are proposed for the railroad ditch. Since a relatively shallow saturated zone appears to exist in this area that may ultimately have an impact on probable excavation activities during site remediation, it is necessary to acquire additional information concerning the nature of this zone and the extent of affected ground water. It is proposed that these wells be drilled, sampled and constructed similar to MW-4 and MW-5 ~~except that the use of PVC screen and casing may be substituted for steel~~. As long as sufficient quantities remain, the galvanized

steel screen and casing currently stored on site will be used for their construction. However, when the galvanized steel is used up, it will be replaced with PVC well construction materials. PVC is not known to be reactive with on-site organic constituents and its use will not result in the reduction of the quality of data. It is also proposed that a deeper well that monitors just the St. Joe Formation might be installed next to one of these three residuum wells. Installation of this well would be dependent upon conditions existing at one of these three locations such that a water table exists within the residuum and a sufficient thickness of St. Joe exists in which an adjacent well could be installed so that it monitors just this horizon. Of the monitor wells installed to date, only MW-1 and MW-5 have a water table developed within the residuum. In each case, the projected thickness of remaining St. Joe Limestone is less than ten feet. This is not sufficient thickness, given the prevalent karst conditions within the subcutaneous zone, in which to install a monitor well and insure that the grout or bentonite seal will isolate the monitored zone from the overlying water bearing zone. "Sufficient thickness" of St. Joe Limestone to warrant an adjacent monitor well installation will be defined as a projected thickness of ten feet or more.

Residuum samples collected during monitor well installation will be handled following the procedures established for the Phase I soil investigation. The surface samples will be analyzed for indicator compounds and selected deeper samples will be screened for the presence of PCP. Depending upon the screening results for each location, the adjacent deeper or shallower sample will be analyzed for the full indicator compound list in an attempt to document the deepest extent of affected soil.

Proposed locations for the new wells are shown on Figure 2-1. The deep nested wells will be located near the edge of the site and as close as possible to the southeastern-most residuum well along the railroad tracks. If suitable conditions exist, this will facilitate possible aquifer testing to determine if the shallow water producing zones are interconnected. Existing wells MW-3, MW-4 or MW-5 may be used for the same purpose. This aquifer testing may consist of nothing more than passive monitoring of water levels with a continuous recording data logger. However, to induce more rapid fluctuations, pump testing may be suggested depending upon the ability of the saturated zone in at least one of the paired wells to produce sufficient volumes of water to allow continuous pumping. This would also be predicated upon prior agreement about the on-site treatment and release of the pumped ground water, assuming that it may contain wood treatment compounds.

In conjunction with new monitor well installation, it is proposed that the strata penetrated by the existing monitor well, PW-1, and the deep on-site well, W-13, be examined through the use of down-hole geophysical techniques. An appropriate suite of logs will be run, suitable for lithologic determination and potentially useful in examining hydrogeologic conditions. ~~The same or similar suite of geophysical logs will be run on the new deep monitor well for purposes of calibration and correlation.~~ To facilitate geophysical logging of the on-site well, W-13, the pump and all piping will be pulled from the well. The protective surface casing will not be removed since it is permanently installed and its total depth is unknown. After pulling the pump, the water level in the well will be allowed sufficient time to reach equilibrium prior to logging. The type of logs that will be used is dependent upon the conditions encountered. If portions of the well are cased and above the water level, it will be difficult to obtain useable data from these portions of the well. Use of the following logs is being proposed:

- Natural Gamma Ray
- SP
- Resistivity
- Temperature
- Gamma - Gamma Density
- Caliper
- Sonic

Table 2-1 discusses the potential use for each of the geophysical logs and the borehole conditions under which they can be run. An attempt will be made to run this entire suite of logs on well W-13.

For purposes of calibration and correlation, it is also proposed that the same suite of logs be run on monitor well PW-1. It was suggested previously that the proposed deep monitor well be used for this purpose. However, it is unknown what geological conditions will be encountered when this well is installed and it will be desirable to observe it for some time without the disruption of extraneous stimuli such as adding water which is necessary for logging. On the other hand, PW-1 has been observed for several months. It is dry and unaffected by wood treating compounds. There will be no harm in temporarily filling it with water from the deep on-site well, W-13, and running the geophysical logs. Upon completion, PW-1 will be bailed dry and left in its present condition.

2.4.4 Dye Tracer Study

Mr. Tom Aley has been requested to provide a dye tracer study proposal suitable for use in the Phase II remedial investigation. Preliminary comments from Mr. Aley indicate his concurrence in the

TABLE 2-1

Downhole Geophysical Techniques

Arkwood, Inc. Site
Omaha, Arkansas

Logging Method	Can be Used in Cased or Dry Hole (a)	Remarks
Gamma Ray	Yes	Use to indicate lithology (shale volumes), locate bed boundaries and correlate between cased and uncased holes.
Gamma-Gamma Density	Yes	Use similar to gamma ray log. Can also use to indicate porosity.
Resistivity	No	Use as indicator of lithology and water quality.
S.P.	No	Use to locate bed boundaries, indicate lithology, estimate minimum permeability and calculate rough water quality (total dissolved solids).
Scnic	No	Use for possible fracture or cavity detection.
Caliper	Yes	Measures irregularities in borehole such as cavities and washouts. Assists in the interpretation of other logs.
Temperature	No	May give indication of water movement, thus identifying water producing zones.

(a) All the listed logging methods can be used in a fluid filled, uncased hole.

belief that the wood treatment compounds themselves have acted as tracers. He believes, based on historical and current analytical data, that pathways have been established between the site and the railroad tunnel spring and New Cricket Spring. However, he also believes that dye studies could identify additional ground water flow paths and provide additional data with which to define local hydrogeology.

A detailed dye tracer study work plan will be made part of the Phase II Work Plan as an addendum.

2.5 Air Quality Monitoring

As previously discussed in the work plan, there is no need for additional air monitoring except in the immediate work vicinity for worker protection. As during previous field activities, this will be carried out by the on-site health and safety officer with the aid of an organic vapor detector (HNU).

2.6 Reporting Requirements

Monthly progress reports will be prepared that summarize the analytical data received and the work completed during the previous month. A summary will also be included of work scheduled and proposed for the following month.

A Final Remedial Investigation Report will be written that summarizes and discusses both the phase I and phase II studies. This final report will include a complete discussion of field activities, data generated, and conclusions.

2.7 Schedule

The milestone chart shown on Figure 2-2 indicates the schedule and sequence of events. Phase II work will begin on October 2, 1989.